

Focus on IFA's work

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Development of a software application for the evaluation of whole-body vibration

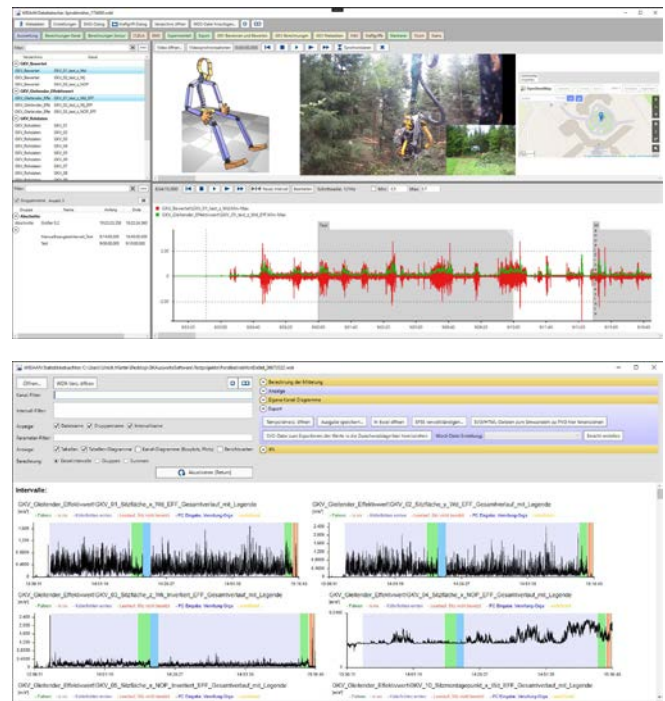
Problem

The IFA's vibration section investigates vibrations that affect the human body during the operation of various machines and records them. A special software application is required to evaluate the effects of whole-body vibration (WBV) on the human body. The IFA's electronics and development laboratory therefore developed its own software for this purpose in 2012.

Since then, the evaluation methods have evolved and compatibility problems with modern operating systems have arisen. This software could therefore no longer be used. A new software solution was needed covering both the legacy and new evaluation methods, capable of running on modern operating systems, and also supporting smooth implementation of future needs for modifications or additions.

Activities

Firstly, the vibration section drew up a specification sheet, containing all the necessary requirements that the new software has to fulfil. The IFA already possesses a tool for the analysis of time series, in the form of the WIDAAN angle data analysis application. WIDAAN is an application that has been tried and tested for many years and is constantly being further developed. For that reason it was examined which of the requirements for the new analysis software WIDAAN might already fulfil. It was found that WIDAAN already covered about 50% of the requirements without any further modification. Consequently, the new evaluation software was to be developed as a WIDAAN extension.



WIDAAN File Viewer with whole-body vibration extension (top) and WIDAAN Statistics Viewer with whole-body vibration extension (bottom)

WIDAAN comprises a variety of different modules that can be combined. It therefore offers a high degree of flexibility, particularly for scientific evaluations.

The *WIDAAN Converter* (not shown) converts WBV-specific file formats into the WIDAAN file format.

All recorded time series data can be viewed synchronously by means of graphs, a 3D dummy, videos, and GPS data in the *WIDAAN File Viewer* (see figure above). All documentation specific to whole-body vibration can be performed in the viewer, as well as the calculation steps required by the standards for filtering and analysing the measurement data. Individual time ranges can be marked so that, for example, only the measurement data for certain activities can be analysed. Furthermore, first simple statistical evaluations can be performed in the whole-body vibration extension. The example in the figure above shows the evaluation of measurement data recorded on a timber harvester during the felling, delimbing and depositing of trees.

More complex evaluations, such as those involving multiple measurement files, can be implemented in the *WIDAAN Project Manager* (not shown) after prior editing in the file viewer.

The results of an evaluation performed in the Project Manager, usually containing parameters and graphs, are displayed in the *WIDAAN Statistics Viewer* (see image above), from which they can be exported, e.g. for use in reports.

Results and use

The whole-body vibration extension for the WIDAAN application was the result of approximately one year of development. It has been used since 2022 by the staff of the vibration section to evaluate vibration measurements. The desired features of the legacy evaluation software and the functionality for implementing new evaluation methods have been implemented and the software can be easily adapted to new requirements in the future.

The flexibility of the IFA's WIDAAN software for adaptation to other tasks by the creation of extensions was also demonstrated. This particularly applies to requirements for viewing and evaluating any given time series data.

User group

Metrological service, consulting and test centers, research institutes

Technical enquiries

- IFA, Administrative Unit "Innovative Work Design"
- IFA, Department "Ergonomics – Physical Environmental Factors"

Literature enquiries

- IFA, Department "Interdisciplinary Services"

Further information

- IFA website: technical information on whole-body and hand-arm vibration
<https://dguv.de/ifa/fachinfos/vibrationen/index-2.jsp>
- IFA website: technical information on ergonomics – CUELA measuring system and back monitor
<https://www.dguv.de/ifa/fachinfos/ergonomie/cuela-messsystem-und-rueckenmonitor/index-2.jsp>

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Edited by:

M. Ulrich, Dr.-Ing. C. Freitag, I. Hermanns-Truxius
 Institute for Occupational Safety and Health
 of the German Social Accident Insurance (IFA)
 Alte Heerstrasse 111, 53757 Sankt Augustin, Germany
 Tel. +49 30 13001-0 · Fax: -38001
 Email: ifa@dguv.de
 Internet: www.dguv.de/ifa